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NEW YORK AIRPORTS DATA PACKAGE NUMBER 2, JOHN F, KENNEDY INTERN--ETC(U)
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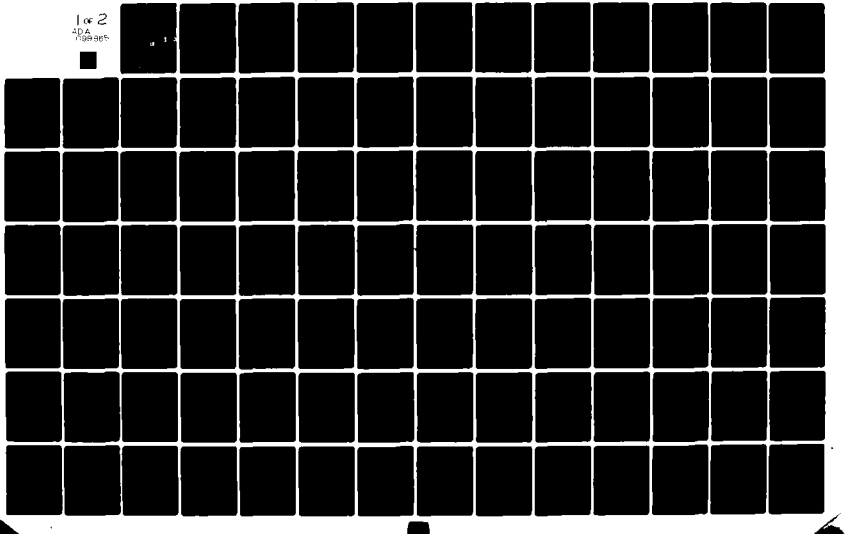


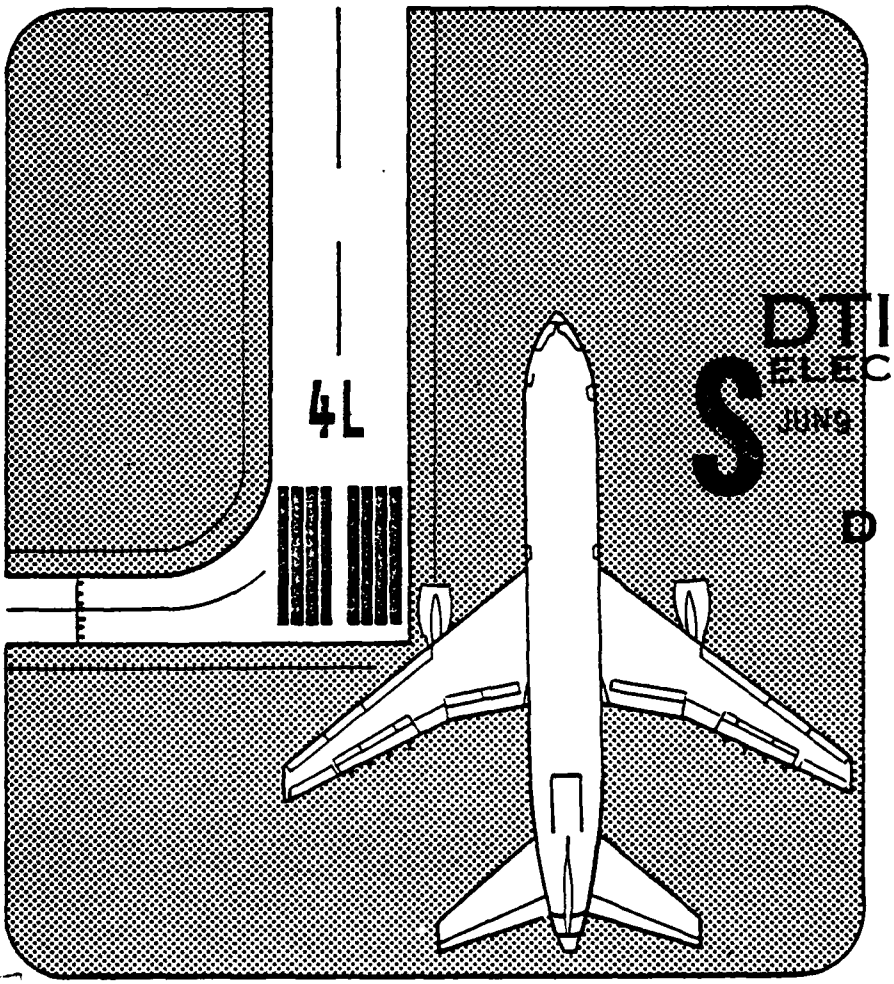
LEVEL III

NEW YORK AIRPORTS

DATA PACKAGE NO. 2

JOHN F. KENNEDY INTERNATIONAL AIRPORT
LA GUARDIA AIRPORT

AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES



prepared for
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
under contract
DOT - FA77WA -3961

PMM&Co. Peat, Marwick, Mitchell & Co.

AUGUST 1978

Telephone: (415) 347-9521

August 23, 1978

Mr. Ray Fowler, AEM-100
U.S. Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Re: Input Data for New York Simulation Model Stage-1 Experiments and Annual Delay Baseline Experiment

Dear Ray:

Enclosed are preliminary data packages for use during the third Task Force meeting on August 24, 1978:

- Attachment A contains the calibration results for John F. Kennedy International Airport and LaGuardia Airport.
- Attachments B and C contain the input data for the Stage-1 Experiments, respectively, for John F. Kennedy International Airport and LaGuardia Airport.

These attachments should be reviewed, revised, and approved by the New York Task Force prior to use in the Stage-1 model runs.

Sincerely,

Stephen L. M. Hockaday
Manager

SLMH/nbe
Enclosures

cc: Mr. J. R. Dupree, ALG-312
Mr. C. Caifa, AEA-4
(both w/encls)

Attachment A

NY CALIBRATION RESULTS

John F. Kennedy International Airport

and

LaGuardia Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California 94128

August 1978

John F. Kennedy International Airport

CALIBRATION RESULTS

I. Arrival Flow Rates

Runway	Time Interval	Field Data	Calibrated Model
31R	20 - 21:00	27	27
31R	21 - 22:00	23	23
31R	22 - 23:00	15	15
31L	20 - 21:00	17	17
31L	21 - 22:00	13	13
31L	22 - 23:00	3	4

II. Departure Flow Rates

Runway	Time Interval	Field Data	Calibrated Model
31L	20 - 21:00	20	21
31L	21 - 22:00	24	25
31L	22 - 23:00	33	29

III. Average Fix-To-Threshold Arrival Travel Times

Fix	Runway	Class	Time Interval	Field Data	Calibrated Model
B	31R	1	21 - 22:00	10.0	10.5
B	31R	1	22 - 23:00	13.0	10.7
G	31R	1	21 - 22:00	11.3	10.4
G	31R	1	22 - 23:00	12.4	10.4
Weighted Average			21 - 22:00	12.3	10.9
Weighted Average			22 - 23:00	11.5	11.0

IV. Weighted Average Gate-To-Roll Departure Travel Times

Time Interval	Field Data	Calibrated Model
20 - 21:00	8.1	9.7
21 - 22:00	11.9	9.0
22 - 23:00	10.9	11.5
Weighted Average	10.4	10.2

LaGuardia Airport

CALIBRATION RESULTS

I. Arrival Flow Rates

Runway	Time Interval	Field Data	Calibrated Model
22	20 - 21:00	39	36
	21 - 22:00	33	36
	22 - 23:00	39	38

II. Departure Flow Rates

Runway	Time Interval	Field Data	Calibrated Model
13	20 - 21:00	29	30
	21 - 22:00	36	38
	22 - 23:00	39	36

III. Average Fix-To-Threshold Arrival Travel Times

Fix	Runway	Class	Time Interval	Field Data	Calibrated Model
C	22	2	20 - 21:00	9.1	9.2
C	22	2	21 - 22:00	10.0	10.4
C	22	2	22 - 23:00	9.2	9.8
R	22	2	20 - 21:00	15.4	15.0
R	22	2	21 - 22:00	16.7	16.8
R	22	2	23 - 23:00	16.0	15.7
W	22	2	20 - 21:00	19.5	17.0
W	22	2	21 - 22:00	21.1	20.1
W	22	2	22 - 23:00	19.2	17.0

IV. Weighted Average Gate-To-Roll Departure Travel Times

Time Interval	Field Data	Calibrated Model
20 - 21:00	8.7	8.5
21 - 22:00	17.4	16.5
22 - 23:00	20.0	17.2

Attachment B

INPUT DATA SUMMARY
STAGE 1 EXPERIMENTS

John F. Kennedy International Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California 94128

August 1978

TABLE III-1 (REVISED)

KENNEDY DELAY EXPERIMENTS

Experiment Number	Model	Study Case[a]	Arrival Runways	Departure Runways	Weather	Demand	ATC System Scenario	Near-Term Improvements
Stage I Experiments								
1	ASM[c]	1	13B, 22L, 22R	22R	VFR1	1977	Today's	None[d]
2	ASM	2	22L	22R	IFR1	1977	Today's	None
2A	ASM	2	22L	22R	IFR1	1977	Today's	None[k]
3	ASM	4	4L, 4R	4L	VFR1	1977	Today's	None
4	ASM	5	4R	4L	IFR1	1977	Today's	None
5	ASM	7	31L, 31R	31L	VFR1	1977	Today's	None
6	ASM	8	31R	31L	IFR1	1977	Today's	None
7	ASM	10	13L, 13R	13R	VFR1	1977	Today's	None
8	ASM	11	13L	13R	IFR1	1977	Today's	None
9	ADM	n.a.[f]	n.a.	n.a.	n.a.	1977	Today's	None
15	ASM	8	31L, 31R	31L	IFR1	1977	Today's	g[d]
16	ASM	7	31L, 31R	31L, 31R	VFR1	1977	Today's	h
18	ASM	5	4L, 4R	4L	IFR1	1977	Today's	i
19	ASM	2	22L	22R	IFR1	1977	Today's	j

a. Study cases (combinations of runway use and weather conditions) and potential near-term improvements are identified in New York Airport Improvement Task Force Interim Report. The study cases are shown in Figure III-1. The potential improvements are identified in Appendix B.
b. FAA will describe impact of post-1982 ATC systems on model inputs.
c. Airfield Simulation Model.
d. Task Force will establish packages of near-term improvements most likely to be implemented in pre-1982 and post-1982 time frames.
f. Not applicable (model considers annual occurrence of each study case).
g. Has procedure for independent arrivals and independent departures on 31L and 31R.
h. Has indepedent departure tracks R31L and R31R.
i. Permits 3 miles staggered arrival separation 4R and 4L.
j. Extends parallel taxiway to runway and 31L and adds a new turnoff to R22L.
k. Turnoff J on Runway 22L is assuemd closed.

JFK
INDEX OF STAGE 1 EXPERIMENTS*

Sequence No.	Experiment No.	Study Case No.	Model	Type of Input Description	Page
1	1	1	ASM	Full	6
2	2	2	ASM	Change-Sheet	14
3	2A	2	ASM	Change-Sheet	16
4	19	2	ASM	Change-Sheet	18
5	3	4	ASM	Full	20
6	4	5	ASM	Change-Sheet	28
7	18	5	ASM	Change-Sheet	30
8	5	7	ASM	Full	32
9	16	7	ASM	Change-Sheet	39
10	6	8	ASM	Change-Sheet	41
11	15	8	ASM	Change-Sheet	43
12	7	10	ASM	Full	45
13	8	11	ASM	Change-Sheet	53
14	9		ADM	Full	--

*Stage 1 experiments as presented in revised Table III-1 but reorganized and grouped by like runway-use configurations.

JFK - STAGE 1

Experiment No. 1

Objective:

To obtain baseline delay estimates for the following runway configuration in VFR 1:

Arrival Runways	Departure Runways
13R, 22L, 22R	22R

Related Comparison Experiments:

Experiments 2, 2A, and 19 have similar runway-use configurations but different weather conditions, namely IFR1 instead of VFR 1.

Remaining Data Items:

- Time period to be simulated - 1500 to 1900 hours local time?
- Schedule inputs and lateness distribution? (see attached input data summary).

JFK INPUT DATA - EXPERIMENT 1

A. LOGISTICS

1. Title: John F. Kennedy International Airport Airfield Simulation Model Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be selected by Task Force - 1500 - 1900 hours.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Freight	AF
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
Foreign International	FI
National	NA
Northwest	NW
Pan American	PA
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runw in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 3.

11. Runway Identification: 13R, 22L, 22R.

12. Departure Runway End Links: 172.

13. Runway Crossing Links: 38, 133, 286.

14. Exit Taxiway Location: 101, 106, 115, 181, 182, 183, 193, 194, 195, 468.

15. Holding Areas: Not applicable.

16. Airline Gates: Not applicable.

17. General Aviation Basing Areas: West of terminal area between Taxiways O and Q; area No. 13.

C. ATC PROCEDURES

18. Aircraft Separations:

Arrival-Arrival Separation (n.m.)

1. VFR: According to Report No. FAA-EM-78-8A.

		Trail Aircraft Class		
		B	C	D
Lead Aircraft Class	B	1.9	1.9	1.9
	C	1.9	1.9	1.9
	D	3.6	3.6	2.7

Departure-Departure Separations (seconds)

2. VFR

		Trail Aircraft Class		
		B	C	C
Lead Aircraft Class	B	45	45	50
	C	60	60	60
	D	120	120	90

Departure-Arrival Separation (n.m): To be based on reduced field data, departure runway occupancy times and discussions with ATC personnel.

Arrival-Departure Separation (seconds): To be based on reduced field data, arrival runway occupancy times, and discussion with ATC personnel.

19. Route Data: See Figure 2.

20. Two-Way Path Data: 205, 206, 267.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 15 minutes.

23. Departure Runway Queue Control:

Aircraft are assigned departure runways to preclude airspace crossovers, not to balance departure queues.

24. Gate Hold Control:

Aircraft are held at gates when departure queue at runway is 20 (15 in queue plus 5 taxiing) or more, except when gate holds would cause gate congestion.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 10 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (Percent)		
	Class	N	M	L
Runway 13R	B	61	39	0
	C	0	41	59
	D	0	24	76

		Exit Utilization (Percent)		
	Class	H	J	JA
Runway 22L	B	17	33	50
	C	10	33	57
	D	0	16	84

		Exit Utilization (Percent)		
	Class	G	H	UU
Runway 22R	B	0	100	0
	C	0	0	100
	D	0	0	100

29. Arrival Runway Occupancy Times:

	Class	Runway Occupancy Times (Seconds) N	M	L
Runway 13R	B	40	51	-
	C	-	45	48
	D	-	48	55

	Class	Runway Occupancy Times (Seconds) H	J	JA
Runway 22L	B	33	45	54
	C	32	37	50
	D	-	42	50

	Class	Runway Occupancy Times (Seconds) G	H	UU
Runway 22R	B	-	35	-
	C	-	-	45
	D	-	-	50

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
B	120	10
C	130	10
D	140	10

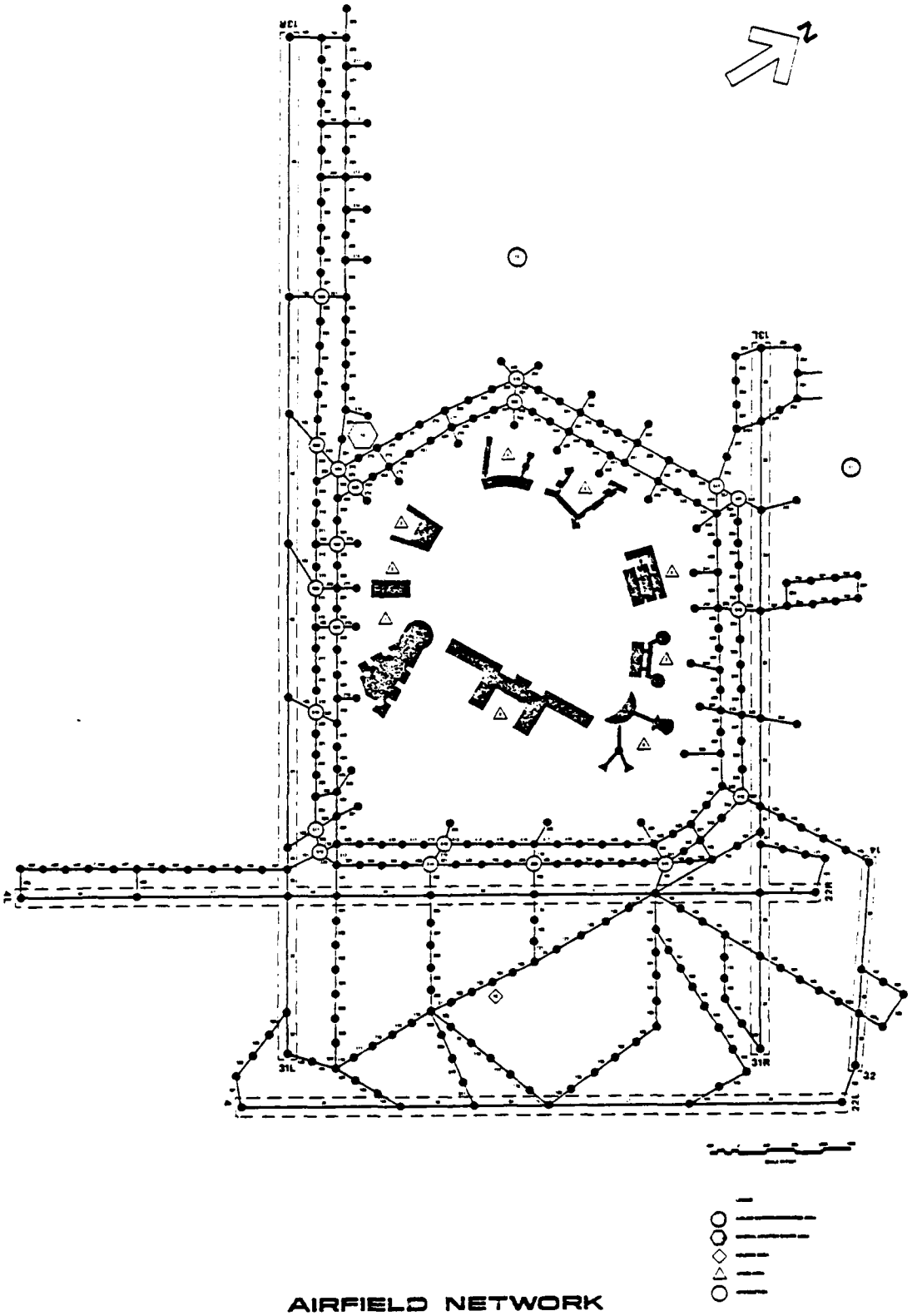
34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: Based on reduced field data (20 seconds).

37 Lateness Distribution: To be determined by Task Force.

38. Demand: Schedule to be determined by Task Force.



AIRFIELD NETWORK

JOHN F. KENNEDY INTERNATIONAL AIRPORT

Figure 1

(Under Development)

Figure 2

JFK - STAGE 1

Experiment No. 2

Objective:

To obtain baseline delay estimates for the following runway-use configuration in IFR1:

Arrival Runways	Departure Runways
22L	22R

Related Comparison Experiments:

Experiments 2A and 19 are for the same runway-use configuration but for different exit taxiway arrangements.

Remaining Data Items:

- Time period to be simulated
- Schedule inputs and lateness distribution.

(See attached change sheet)

Experiment Number: 2 (Input changes from experiment number 1)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Goals	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Connection limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	No arrivals on Runway 13R
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Weather Conditions
19 Route data	No routes from 13R to gate areas.
20 Two-way path data	
21 Common approach paths	IFR1
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Latencies distribution	IFR1 if different from VFR1
38 Demand	

JFK - STAGE 1

Experiment No. 2A

Objective:

To provide baseline comparison delay estimates for the situation where exit taxiway J from arrival runway 22L is closed and aircraft that miss exit H must exit at the end of the runway and taxi up runway 31L across departure runway 22R.

Related Comparison Experiments:

Experiment 19 provides the case where a new exit (between J and H) is provided from Runway 22L and parallel taxiway I is extended to the end of Runway 31L.

Remaining Data Items:

- Time period to be simulated
- Schedule inputs and lateness distribution.

Experiment Number: A (Input changes from experiment number 2)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Trials	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	No arrivals on runway 13R
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Weather
19 Route data	No routes from 13R to gate
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	Exit Taxiway J closed.
29 Arrival runway occupancy times	IFR Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	
38 Demand	

JFK - STAGE 1

Experiment No. 19

Objective:

To investigate potential benefits of adding an additional turnoff runway 22L between exits H and J and extending parallel taxiway I to the end of Runway 31L .

Arrival Runways	Departure Runways
22L	22R

Related Comparison Experiments:

Experiments 2 and 2A.

Remaining Data Items:

- Time period to be estimated
- Schedule inputs and lateness distribution

Experiment Number: 19 (Input changes from xperiment number 2)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	No arrivals on Runway 13R
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values
19 Route data	New parallel taxiway, none from 13R
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	New Exit between H & J
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	
38 Demand	

JFK STAGE-1 EXPERIMENTS

Experiment No. 3

Objective:

To obtain baseline delay estimates in VFR1 conditions for the following runway-use configuration:

Arrival Runways	Departure Runways
4L, 4R	4L

Related Comparison Experiments:

Experiment 4 has the same basic runway-use configuration without arrivals on 4L, and Experiment 18 has the same configuration but with 3-mile staggered arrival separations on 4R and 4L.

(See attached Input Data Summary and routing map).

JFK INPUT DATA - EXPERIMENT NO. 3

A. LOGISTICS

1. Title: John F. Kennedy International Airport Airfield Simulation Model Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Freight	AF
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
Foreign Internatioanl	FI
National	NA
Northwest	NW
Pan American	PA
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runw in COMPUTE mode.

7. Truncation Limits: ± 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2.

11. Runway Identification: 4L, 4R.

12. Departure Runway End Links: 456.

13. Runway Crossing Links: 143.

14. Exit Taxiway Location: 134, 144, 153, 182, 183, 184.

15. Holding Areas: On Taxiway Z between Runways 4L-22R and 4R-22L; area No. 10.

16. Airline Gates: Not applicable.

17. General Aviation Basing Areas: West of terminal area between Taxiways O and Q; area No. 13.

C. ATC PROCEDURES

18. Aircraft Separations:

Arrival-Arrival Separation (n.m.)

1. VFR: According to Report No. FAA-EM-78-8A.

		Trail Aircraft Class		
		B	C	D
Lead Aircraft Class	B	1.9	1.9	1.9
	C	1.9	1.9	1.9
	D	3.6	3.6	2.7

Departure-Departure Separations (seconds)

1. VFR: According to Report No. FAA-EM-78-8A.

		Trail Aircraft Class		
		B	C	C
Lead Aircraft Class	B	60	60	60
	C	60	60	60
	D	120	120	90

Departure-Arrival Separation (n.m.): To be based on reduced field data, departure runway occupancy times, and discussions with ATC personnel.

Arrival-Departure Separation (seconds): To be based on reduced field data arrival runway occupancy times and discussions and ATC personnel.

19. Route Data: See Figure 2.

20. Two-Way Path Data: 261, 267.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path-VFR
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays between vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 15 minutes.

23. Departure Runway Queue Control:

Aircraft are assigned departure runways to preclude airspace crossovers, not to balance departure queues.

24. Gate Hold Control:

Aircraft are held at gates when departure queue at runway is 20 or more, except when gate holds would cause gate congestion.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, 4L arrivals are closed down when departure delays on 4L exceed 10 minutes. Thus a very large interarrival gap is inserted when this trigger is reached.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a tzxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 20 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (Percent)		
	Class	H	G	Z
Runway 4L	B	61	39	0
	C	0	45	55
	D	0	14	86

		Exit Utilization (Percent)		
	Class	F	FA	32
Runway 4R	B	17	33	50
	C	7	37	57
	D	0	13	87

29. Arrival Runway Occupancy Times:

	Class	Runway Occupancy Times (Seconds) H	G	Z
Runway 4L	B	40	51	-
	C	-	45	48
	D	-	48	55

	Class	Runway Occupancy Times (Seconds) F	FA	32
Runway 4R	B	33	45	54
	C	32	37	50
	D	-	42	50

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on calibration results.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
B	120	10
C	130	10
D	140	10

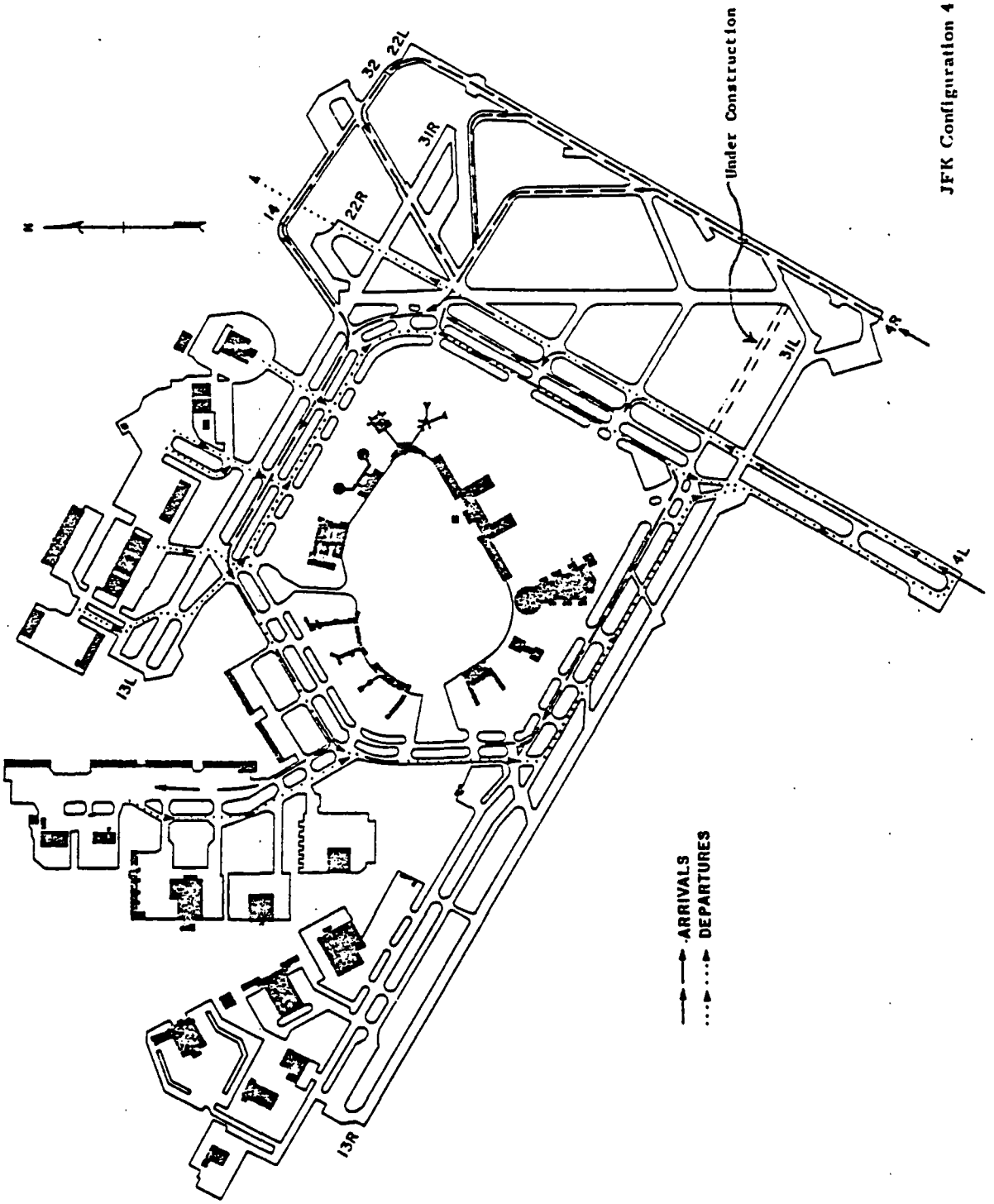
34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: To be based on reduced field data (20 seconds).

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.



TAXI ROUTES TO EXPERIMENT NO. 3

Figure 2

JFK STAGE - 1 EXPERIMENTS

Experiment No. 4

Objective:

To obtain baseline capacity estimates in IFR1 conditions for the following runway-use configurations:

Arrival Runways	Departure Runways
4R	4L

Related Comparison Experiments:

Experiment 3, which is in VFR, has same runway-use configurations with 4L also used for arrivals and Experiment 18 has similar configurations but with 3-mile staggered arrivals.

(See attached change sheet)

JFK

Experiment Number 4 (Input changes fro- experiment number 3)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Truncation limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	4L not used for arrivals
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	No exit taxiways on 4L
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values
19 Route data	No routes from 4L to gate areas
20 Two-way path data	
21 Common approach paths	IFR1 values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	No trigger needed-no arrivals on 4L
27 Runway crossing delay control	Only separations to next departure on Runway 4L, not next arrival
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	None on 4L
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 Conditoins if different.
38 Demand	

JFK STAGE - 1 EXPERIMENTS

Experiment No. 18

Objective:

To provide estimates of the expected delay reduction associated with using 3-mile staggered separations on Runways 4L and 4R in less than visual conditions in periods of high arrival demand.

Related Comparison Experiments:

Experiment 3, a VFR1 experiment, has a similar runway configuragion, and Experiment 4 provides a direct comparison for this experiment.

(See attached change sheet)

Experiment Number: 18 (Input changes from experiment number 3)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Truncation limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values and 3-mile staggered seps.
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	A higher trigger value for 4L
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 Condition if different.
38 S [illegible]	

JFK STAGE - 1 EXPERIMENTS

Experiment No. 5

Objective:

To obtain baseline delay estimates in VFR1 for the following runway-use configuration:

Arrival Runways	Departure Runways
31L, 31R	31L

Related Comparison Experiments:

Experiment 16, also in VFR1, has same configuration but with short-range departures on 31R and independent departure tracks. Experiments 6 and 15 have the same basic runway-use configuration but in IFR1.

(See attached input data summary)

JFK INPUT DATA - EXPERIMENT NO. 5

A. LOGISTICS

1. Title: John F. Kennedy International Airport Airfield Simulation Model Run - Exp.

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Freight	AF
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
Foreign International	FI
National	NA
Northwest	NW
Pan American	PA
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: ± 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2.

11. Runway Identification: 31L, 31R.

12. Departure Runway End Links: 109.

13. Runway Crossing Links: 242, 243.

14. Exit Taxiway Location: 194, 195, 196, 197, 238, 243.

15. Holding Areas: A dummy holding area will be used, as it does not apply to this run.

16. Airline Gates: Not applicable.

17. General Aviation Basing Areas: West of terminal area between Taxiways O and Q; area No. 13.

C. ATC PROCEDURES

18. Aircraft Separations:

Arrival-Arrival Separation (n.m.)

1. VFR: According to Report No. FAA-EM-78-8A.

		Trail Aircraft Class		
		B	C	D
Lead Aircraft Class	B	1.9	1.9	1.9
	C	1.9	1.9	1.9
	D	3.6	3.6	2.7

Departure-Departure Separations (seconds)

2. VFR: According to Report No. FAA-EM-78-8A and previous capacity inputs.

		Trail Aircraft Class		
		B	C	C
Lead Aircraft Class	B	60	60	60
	C	60	60	60
	D	120	120	90

Departure-Arrival Separation (n.m): To be based on reduced field data, departure runway occupancy times and discussions with ATC personnel.

Arrival-Departure Separation (seconds): To be based on reduced field data, arrival runway occupancy times, and discussion with ATC personnel.

19. Route Data: See Figure 2.

20. Two-Way Path Data: 158, 159, 160, 161, 162, 163, 164, 165, 166, 184, 202, 220, 275.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 15 minutes.

23. Departure Runway Queue Control:

Aircraft are assigned departure runways to preclude airspace crossovers, not to balance departure queues.

24. Gate Hold Control:

Aircraft are held at gates when departure queue at runway is 20 or more, except when gate holds would cause gate congestion.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft on 31L are on 8-mi. separations in the arrival airspace when departure delays on 31L are significant, say 5 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 10 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (Percent)				
	Class	E	D	B	A	W
Runway 31R	A	100	0	0	0	0
	B	61	39	0	0	0
	C	0	5	59	36	0
	D	0	4	37	53	6

		Exit Utilization (Percent)			
	Class	L	M	N	PA
Runway 31L	A	100	0	0	0
	B	17	33	50	0
	C	7	33	57	3
	D	0	16	47	37

29. Arrival Runway Occupancy Times:

		Runway Occupancy Times (Seconds)				
	Class	E	D	B	A	W
Runway 31R	A	44	-	-	-	-
	B	40	51	-	-	-
	C	-	45	48	61	-
	D	-	48	55	65	72

	Class	Runway Occupancy Times (Seconds) L	M	N	PA
Runway 31L	A	35	-	-	-
	B	33	45	54	-
	C	32	37	50	59
	D	-	42	50	61

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on calibration results.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	120	10
B	120	10
C	130	10
D	140	10

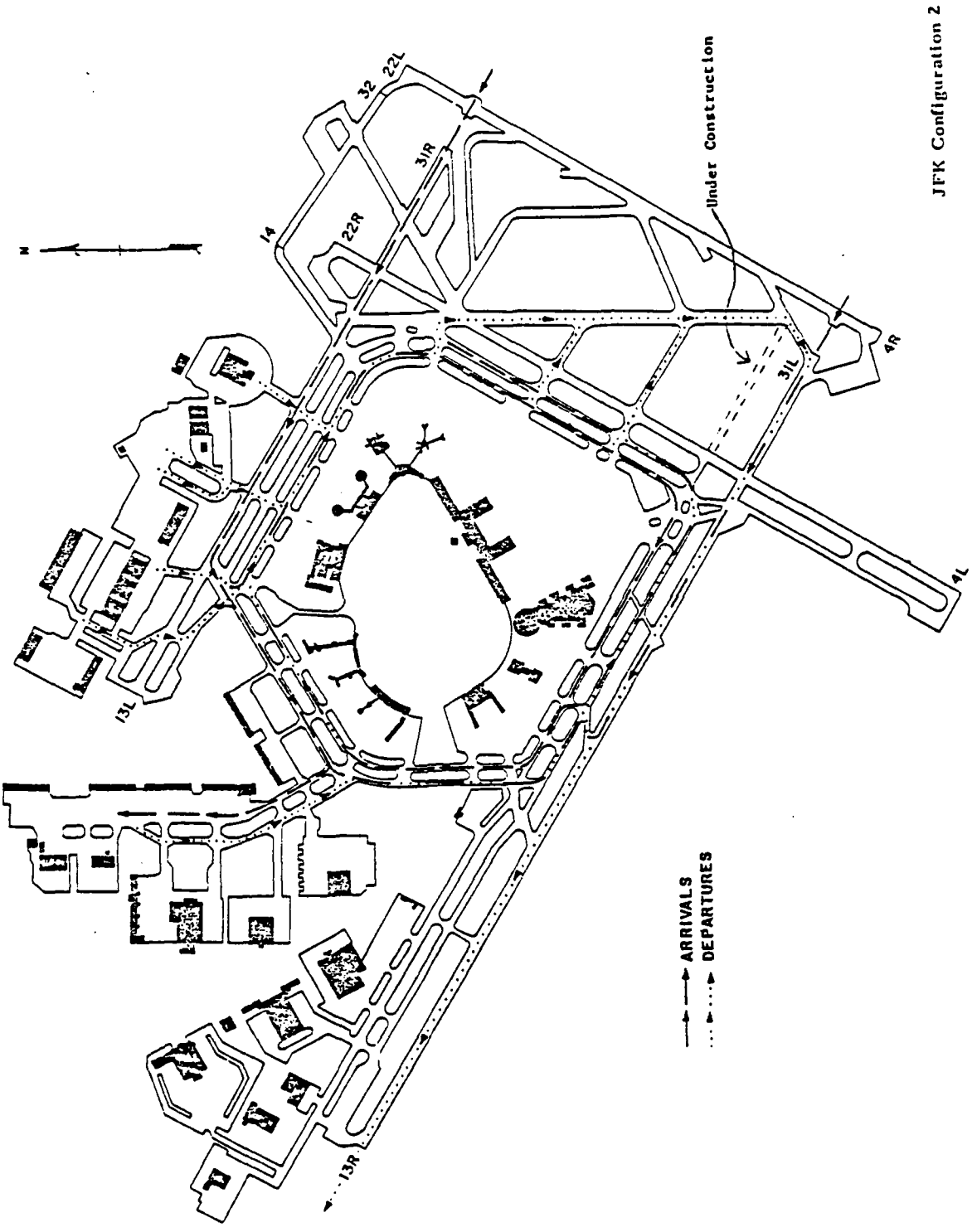
34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: To be based on reduced field data (20 seconds).

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.



TAXI ROUTES FOR EXPERIMENT NO. 5

Figure 2

JFK STAGE - 1 EXPERIMENTS

Experiment No. 16

Objective:

To investigate the potential benefits of independent departure tracks on runways 31L and 31R (31R used for short-range departures) in VFR1 conditions and the following runway-use configurations:

Arrival Runways	Departure Runways
31L, 31R	31L, 31

Related Comparison Experiments:

The effect of the independent departures on 31L and 31R can be evaluated by comparing Experiment 16 with Experiment 5.

(See attached change sheet)

Experiment Number 16 (Input changes fro experiment number 5)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Truncation limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	R31R used for departures
11 Runway identification	
12 Departure runway end links	R31R used for departures
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	Mixed operations on both runways
19 Route data	departure routes to R31R
20 Two-way path data	
21 Common approach paths	
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	On both runways
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	Departures on R31R
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	
38 Demand	Short-range departures on R31R

JFK STAGE - 1 EXPERIMENTS

Experiment No. 6

Objective:

To provide baseline delay estimates in IFR1 conditions, for the following runway-use configurations:

Arrival Runways	Departure Runways
31R	31L

Related Comparison Experiments:

Experiment 15 will have the same basic runway-use configurations in IFR1 but with independent arrivals and independent departures on both R31R and R31L.

(See attached change sheet).

Experiment Number: 6 (Input changes from experiment number 5)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	Only R31R used for arrivals
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	Only on R31R
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values
19 Route data	No routes from R31L to gates
20 Two-way path data	
21 Common approach paths	IFR Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	None on R31L
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	IFR1 Values
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 Values if different
38 Demand	No arrival assignments to R31L

JFK STAGE - 1 EXPERIMENTS

Experiment No. 15

Objective:

To investigate the potential delay savings associated with having independent arrivals, independent departures, and independent missed approach tracks on Runways 31R and 31L in IFR1 conditions.

Related Compariosn Experiments:

Experiment 6 serves as the basis for evaluating the impact of the improvements in Experiment 15.

(See attached change sheet)

Experiment Number: 5 (Input changes from xperiment number 5)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	R31R also used for departures
11 Runway identification	
12 Departure runway and links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values, R31R & R31L indep.
19 Route data	R31R also used for departures
20 Two-way path data	
21 Common approach paths	
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	On both runways
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	IFR1 Values, also for R31R
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	IFR1 Values
36 Runway crossing times	
37 Lateness distribution	IFR1 if different
38 Demand	Departure runway assignments to both 31L and 31R.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 7

Objective:

To obtain baseline delay estimates, in VFR1 conditions, for the following runway-use configuration:

Arrival Runway	Departure Runways
13L, 13R	13R

Related Comparison Experiments:

Experiment 8 has the same basic runway-use configuration in IFR1 conditions.

(See attached input summary)

JFK INPUT DATA - EXPERIMENT NO. 7

A. LOGISTICS

1. Title: John F. Kennedy International Airport Airfield Simulation Model Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Freight	AF
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
Foreign International	FI
National	NA
Northwest	NW
Pan American	PA
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2.

11. Runway Identification: 13L, 13R.

12. Departure Runway End Links: 197.

JFK INPUT DATA - EXPERIMENT NO. 7

A. LOGISTICS

1. Title: John F. Kennedy International Airport Airfield Simulation Model Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Freight	AF
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
Foreign International	FI
National	NA
Northwest	NW
Pan American	PA
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: ± 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2.

11. Runway Identification: 13L, 13R.

12. Departure Runway End Links: 197.

13. Runway Crossing Links: 242, 243.

14. Exit Taxiway Location: 52, 163, 167, 187, 192, 193, 194, 195, 223, 226, 238.

15. Holding Areas: On Taxiway Z between Runways 4L-22R and 4R-22L; area No. 10.

16. Airline Gates: Not applicable.

17. General Aviation Basing Areas: West of terminal area between Taxiways O and Q; area No. 13.

C. ATC PROCEDURES

18. Aircraft Separations:

Arrival-Arrival Separation (n.m.)

1. VFR: According to Report No. FAA-EM-78-8A.

		Trail Aircraft Class		
		B	C	D
Lead Aircraft Class	B	1.9	1.9	1.9
	C	1.9	1.9	1.9
	D	3.6	3.6	2.7

Departure-Departure Separations (seconds)

1. VFR: According to Report No. FAA-EM-78-8A.

		Trail Aircraft Class		
		B	C	D
Lead Aircraft Class	B	60	60	60
	C	60	60	60
	D	120	120	90

Departure-Arrival Separation (n.m): To be based on reduced field data, departure runway occupancy times, and discussion with ATC personnel.

Arrival-Departure Separation (seconds): To be based on reduced field data, arrival runway occupancy times, and discussions with ATC personnel.

19. Route Data: See Figure 2.

20. Two-Way Path Data: 206, 207, 226, 239.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 15 minutes.

23. Departure Runway Queue Control:

Aircraft are assigned departure runways to preclude airspace crossovers, not to balance departure queues.

24. Gate Hold Control:

Aircraft are held at gates when departure queue at runway is 20 (15 in queue and 5 taxiing) or more, except when gate holds would cause gate congestion.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 10 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (Percent)				
	Class	B	D	E	Z	22R
Runway 13L	B	61	39	0	0	0
	C	0	5	59	36	0
	D	0	4	37	53	6

		Exit Utilization (Percent)			
	Class	N	M	L	K
Runway 13R	B	17	33	50	0
	C	7	33	57	0
	D	0	16	47	37

29. Arrival Runway Occupancy Times:

		Runway Occupancy Times (Seconds)				
	Class	B	D	E	Z	22R
Runway 13L	B	40	51	-	-	-
	C	-	45	48	61	-
	D	-	48	55	65	72

		Runway Occupancy Times (Seconds)			
	Class	N	M	L	K
Runway 13R	B	33	45	54	-
	C	32	37	50	59
	D	-	42	50	61

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	120	10
B	120	10
C	130	10
D	140	10

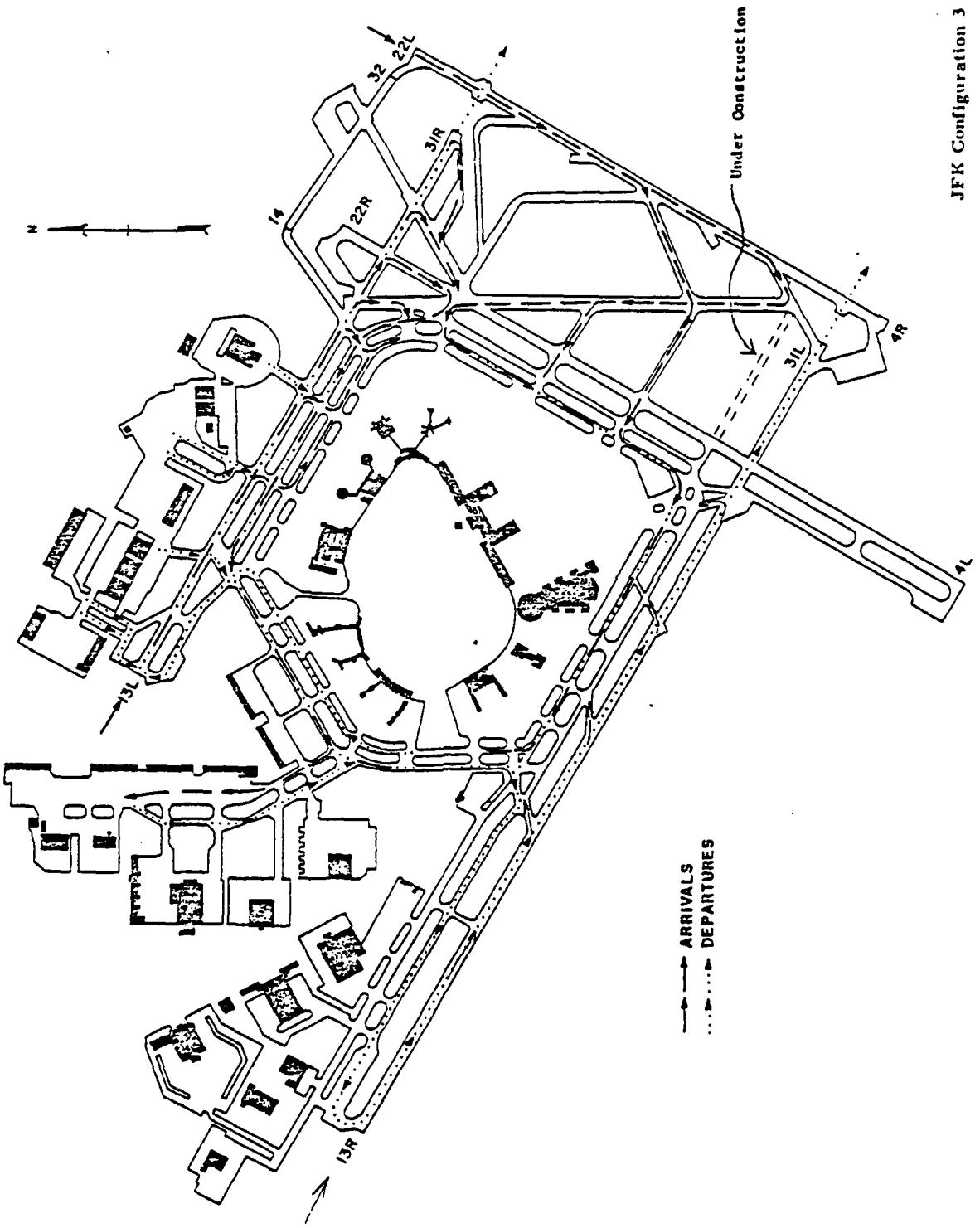
34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: To be based on reduced field data (20 seconds).

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.



TAXI ROUTES--EXPERIMENT NO. 1
(Revision Under Development)

Figure 2

JFK STAGE - 1 EXPERIMENTS

Experiment No. 8

Objective:

To obtain baseline capacity estimates, in IFR1 weather conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
13L	13R

Related Comparison Experiments:

Experiment No. 7 has the same basic runway-use configurations but is in VFR1 conditions.

(See attached change sheet)

Experiment Number: 2 (Input changes from xperiment number 7)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Truncation limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	R13R not used for arrivals in IFR1
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	None on R13R
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values
19 Route data	None from R13R to gate areas
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	None on R13R
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	None on R13R
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	IFR1 Values if different
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	for IFR1 if different
38 Demand	no arrival assignments to R13R.

Attachment C

INPUT DATA SUMMARY
STAGE 1 EXPERIMENTS

LaGuardia Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

August 1978

TABLE III-2 (REVISED)

LA GUARDIA DELAY EXPERIMENTS

Experiment Number	Model	Study Case[a]	Arrival Runways	Departure Runways	Weather	Demand	ATC System Scenario	Near-Term Improvements
Stage I Experiments								
1	ASM[c]	1	22	13	VFR1	1977	Today's	None
2	ASM	2	22	13	IFR1	1977	Today's	None
3	ASM	3	22	13	IFR2	1977	Today's	None
4	ASM	13	4	31	IFR2	1977	Today's	None
5	ASM	10	4	13	VFR1	1977	Today's	None
6	ASM	22	13	13	VFR1	1977	Today's	None
7	ASM	23	13	13	IFR1	1977	Today's	None
8	ASM	26	4	4	IFR1	1977	Today's	None
9	ASM	20	13	4	IFR1	1977	Today's	e[d]
10	ASM	23	13	13	IFR1	1977	Today's	f
10A	ASM	23b	13	13	IFR1	1977	Today's	g
11	ASM	3	22	13	IFR2	1977	Today's	h
12	ASM	2	22	13	IFR1	1977	Today's	i
13	ASM	26	4	4	IFR1	1977	Today's	i
19	ASM	1	22	13	VFR1	1977	Today's	j
20	ASM	3	22	13	IFR2	1977	Today's	j
14	ADM	n.a.	n.a.	n.a.	n.a.	1977	Today's	None

a. Study cases (combinations of runway use and weather conditions) and potential near-term improvements are identified in New York Airport Improvement Task Force Interim Report. The study cases are shown in Figure III-2. The potential improvements are identified in Appendix B.
b. FAA will describe impact of post-1982 ATC systems on model inputs.
c. Airfield Simulation Model.
d. Task Force will establish packages of near-term improvements most likely to be implemented in pre-1982 and post-1982 time frames.
e. Has improved airspace procedures and a high speed exit from Runway 13 to Taxiway O.
f. Relocates Runway 13 glide slope antenna to reduce critical zone impact.
g. Has LGA/TEB interaction.
h. Has ASDE.
i. Has improved taxiway network, including partial parallel to Runway 4.
j. Demand-delay relationship relating to impact of quota system alternatives.

LaGuardia Airport

INDEX OF STAGE 1 EXPERIMENTS

Stage 1 experiments as presented in revised Table III but reorganized and grouped by like runway configuration.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 1

Objective:

To provide baseline delay estimates, in VFR1 conditions, for the following runway-use configuration:

Arrival Runway	Departure Runways
22	13

Related Comparison Experiments:

Experiment 19 has same runway-use configuration and weather conditions but a different aircraft mix, to reflect impact of quota system alternatives. Experiments, 2, 3, 11, 12, and 20 have the same basic runway-use configuration but different weather conditions.

Remaining Data Input Needs:

- Time period to be simulated
- Schedule inputs and lateness (distribution(s)

(See attached input data summary)

LGA INPUT DATA - EXPERIMENT 1

A. LOGISTICS

1. Title: LaGuardia Airport Airfield Simulation Model Stage-1 Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
National	NA
North Central	NC
Northwest	NW
Ozark	OZ
Piedmont	PI
Southern	SO
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2

11. Runway Identification: 22, 13.

12. Departure Runway End Links: 50, 114

13. Runway Crossing Links: 58, 82, 85, 86

14. Exit Taxiway Location: 77, 78, 80, 81, 178, 179

15. Holding Areas: 44, 45, 46, 49

16. Airline Gates: Gate Areas are used.

17. General Aviation Basing Areas: West of terminal area, 48.

C. ATC PROCEDURES

18. Aircraft Separations: These values are based on Report No. FAA-EM-78-8A.

Arrival-Arrival Separation (n.m.)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.9	1.9	1.9	1.9
	B	2.7	1.9	1.9	1.9
	C	2.7	1.9	1.9	1.9
	D	4.5	3.6	3.6	2.7

Departure-Departure Separations (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	35	45	45	50
	B	50	60	60	60
	C	50	60	60	60
	D	120	120	120	90

The following values are based on reduced field data and previous capacity studies.

Departure-Arrival Separation (n.m.): 0.4 miles

Arrival-Departure Separation (seconds): 10 seconds

19. Route Data: See Figure 2.

20. Two-Way Path Data: To be determined during detailed network coding.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 12 minutes.

23. Departure Runway Queue Control: Not applicable.

24. Gate Hold Control: Not applicable.

25. Departure Airspace Constraints:

Aircraft are held at gates due to lack of real estate not departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 30 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (percent)				
	Class	F	D	C	B	A
Runway 22	A	100	0	0	0	0
	B	57	0	43	0	0
	C	0	6	58	36	0
	D	0	0	9	72	19

29. Arrival Runway Occupancy Times:

	Class	Runway Occupany Times (seconds) F	D	C	B	A
Runway 22	A	40	-	-	-	-
	B	42	-	48	-	-
	C	-	41	44	52	-
	D	-	-	47	58	64

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on calibrated model.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	110*	10
B	120	10
C	130	10
D	140	10

*120 knots in IFR.

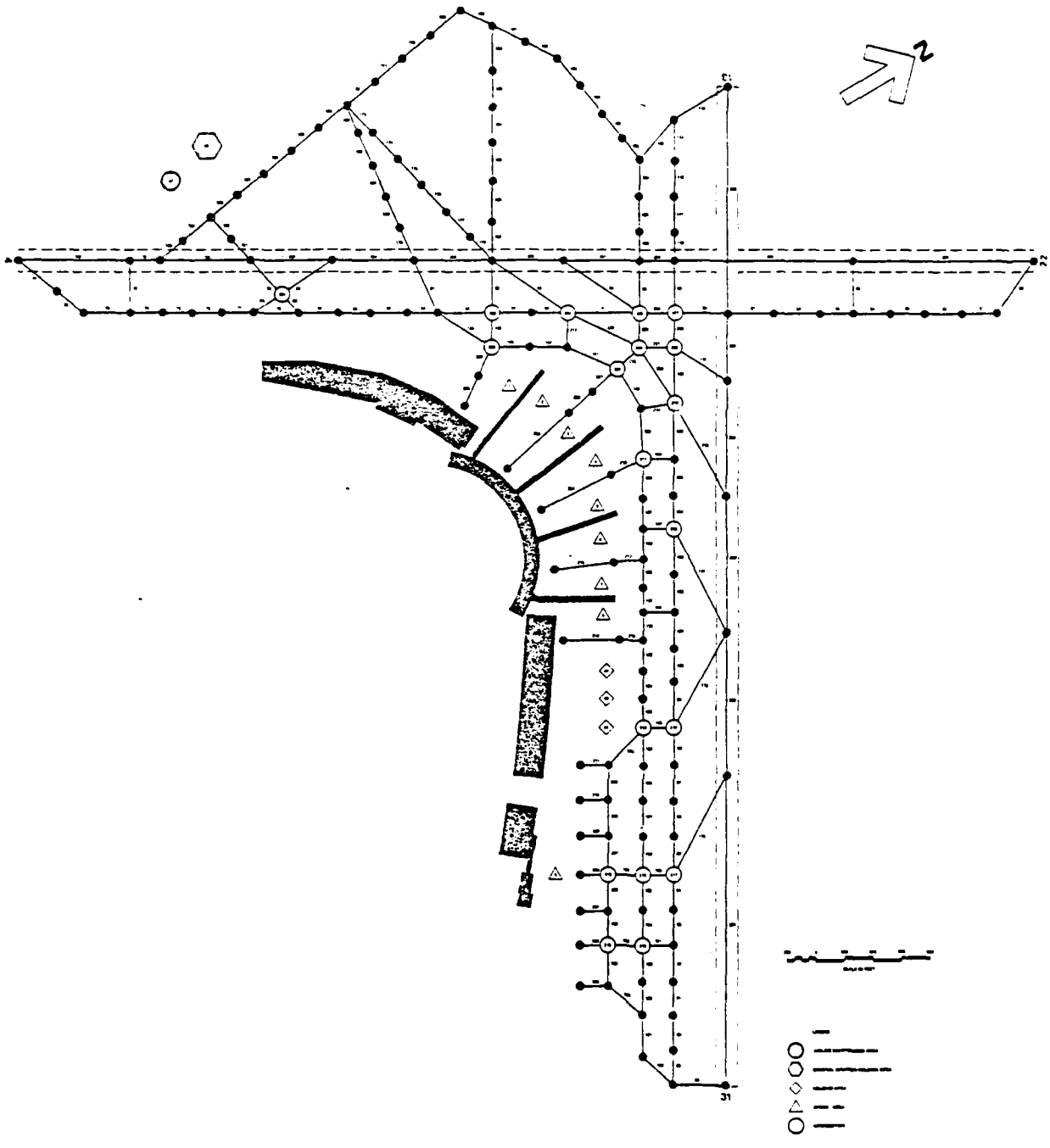
34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on calibrated model.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be determined by Task Force.

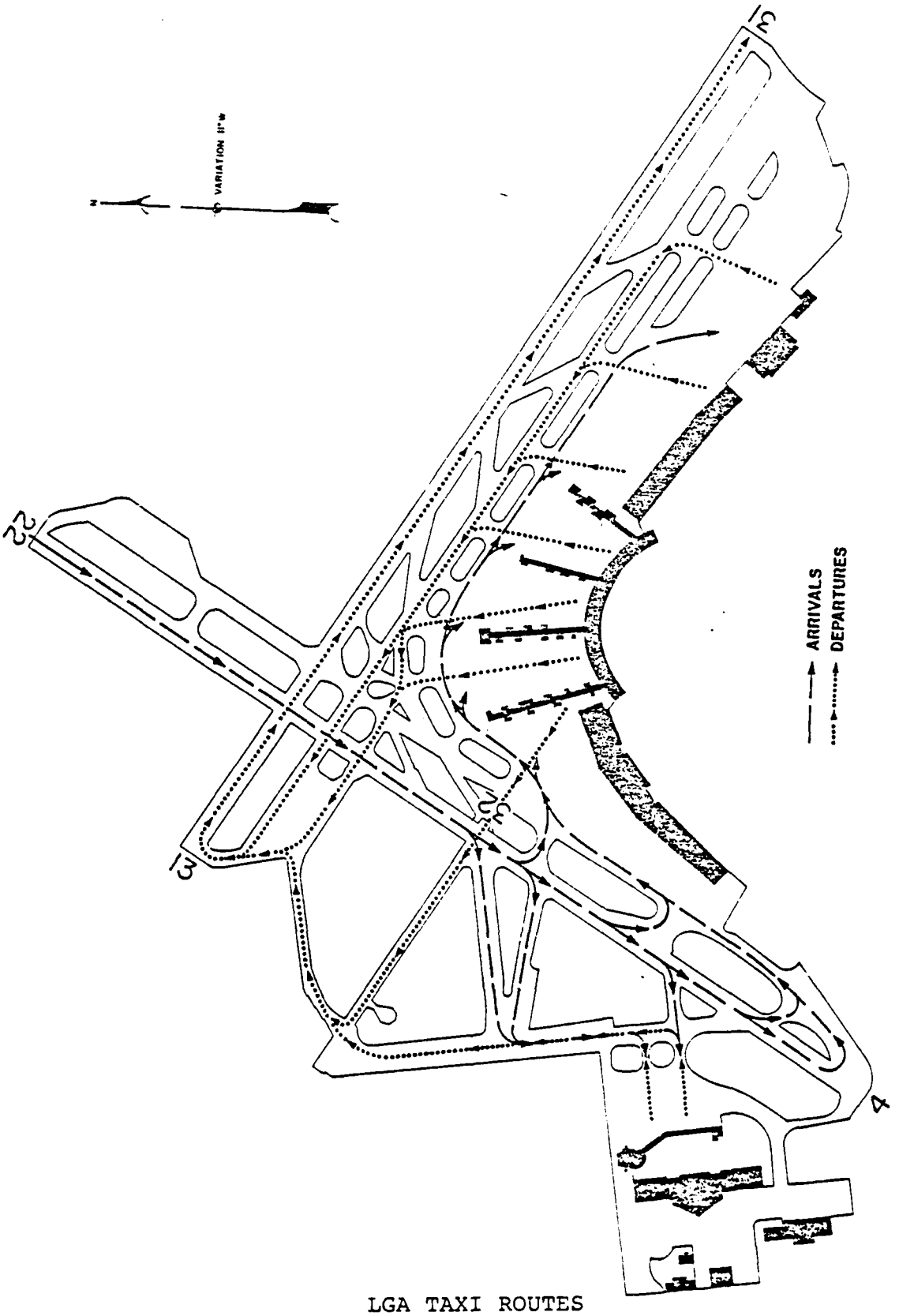
38. Demand: To be determined by Task Force.



AIRFIELD NETWORK

LA GUARDIA AIRPORT

Figure 1



LGA TAXI ROUTES

Figure 2

LGA STAGE - 1 EXPERIMENTS

Experiment No. 19

Objective:

To evaluate the impact in VFR1 conditions of case-sepcific observed (1977) aircraft mix that differs from the FAR-93 mix used in the baseline capacity experiments.

Related Comparison Experiments:

The impact will be evaluated by comparison with results of Experiment No. 1.

Remaining Data Input Needs:

The input schedule must reflect the quota mix, i.e., it must assume that FAR-93, Subpart K, quota, is enforced.

(See attached change sheet).

Experiment Number: 19 (Input changes from experiment number 1)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Goals	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Connection limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	
19 Route data	
20 Two-way path data	
21 Common approach paths	
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	
38 Demand	Must reflect FAR-93, Subpart K, quota.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 2

Objective:

To obtain baseline delay estimates in IFR1 weather conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
22	13

Related Comparison Experiments:

Experiment No. 12 is for the same runway-use and weather, but it involves an improved taxiway network west of R4/22 and a partial parallel to Runway 4.

(See attached change sheet).

Experiment Number: 2 (Input changes from experiment number 1)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Trials	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Truncation limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR Values
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 (if different)
38 Demand	

LGA STAGE - EXPERIMENTS

Experiment No. 12

Objective:

To evaluate the impact of an improved taxiway network west of R4/22 and a partial parallel to Runway 4.

Related Comparison Experiments:

Experiment 2 serves as the baseline case to evaluate this experiment.

Remaining Data Items:

A way must be found to circumvent the fact that the model assumes one and only one path from gate to departure-runway end.

(See attached change sheet).

Experiment Number: 12 (Input changes from experiment number 1)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Trials	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	Improved taxiway network
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	Improved Taxiway Network
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Twin taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 (if different)
38 Demand	Must circumvent one-taxi-out-path problem.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 3

Objective:

To obtain baseline delay estimates, in IFR2 weather conditions, for the following runway-use configurations:

Arrival Runways	Departure Runways
22	13

Related Comparison Experiments:

Experiments 11 and 20 have same conditions.

(See attached change sheets).

Experiment Number: 3 (Input changes from experiment number 1)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Initialization	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR2 Values
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR2 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR2 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR2 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	For IFR2 (if different)
38 Demand	For IFR2 (if different)

LGA STAGE - 1 EXPERIMENTS

Experiment No. 11

Objective:

To evaluate effect of ASDE on delay estimates for IFR2 conditions.

Related Comparison Experiments:

Experiment 3 has the same conditions but with no ASDE improvement.

Remaining Data Items:

Must quantify effect of ASDE on departure releases.

(See attached change sheet)

Experiment Number: 11 (Input changes from xperiment number 1)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Generation limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR2 Separations
19 Route data	Reflect effect of ASDE
20 Two-way path data	
21 Common approach paths	IFR2 Values
22 Vectoring delays	
23 Departure runway queue control	Reflect effect of ASDE
24 Gate hold control	Reflect effect of ASDE
25 Departure airspace constraints	
26 Departure queue	Reflect effect of ASDE
27 Runway crossing delay control	Reflect effect of ASDE
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR2 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR2 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	For IFR2 (if different)
38 Demand	For IFR2 (if different)

LGA STAGE - 1 EXPERIMENTS

Experiment No. 20

Objective:

To evaluate effect of quota mix in IFR2 conditions -- see Experiment No. 19.

Related Comparison Experiments:

Experiment 3 is the baseline case; Experiment 19 is similar but in VFR1 conditions.

(See attached change sheet).

Experiment Number: 20 (Input changes from experiment number 3)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Initiation	
1 Scale	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	
19 Route data	
20 Taxiway path data	
21 Common approach paths	
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	
38 Demand	Must reflect FAR-93, Subpart K, quota.

LGA STAGE 1 EXPERIMENTS

Experiment No. 4

Objective:

To obtain baseline delay estimates, in IFR2 conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
4	31

Related Comparison Experiments

None in Stage-1; possible Stage-2 experiment.

Remaining Data Items

- Schedule with runway assignments
- Additional separation added for safety assurance due to wind shear, etc.

(See attached input summary).

LGA INPUT DATA - EXPERIMENT NO. 4

A. LOGISTICS

1. Title: LaGuardia Airport Airfield Simulation Model Stage-1 Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
National	NA
North Central	NC
Northwest	NW
Ozark	OZ
Piedmont	PI
Southern	SO
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: ± 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

Number of Runways: 2

Runway Identification: 4, 31.

12. Departure Runway End Links: 88.

13. Runway Crossing Links: 110, 152, 167, 179.

14. Exit Taxiway Location: 50, 83, 84, 87.

15. Holding Areas: 44, 45, 46, 49.

16. Airline Gates: Gate Areas Used.

17. General Aviation Basing Areas: West of terminal area, 48.

C. ATC PROCEDURES

18. Aircraft Separations: These values are based on Report No. FAA-EM-78-8.

Arrival-Arrival Separation (n.m.) - IFR Without Buffer

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	3.0	3.0	3.0	3.0
	B	4.0	3.0	3.0	3.0
	C	4.0	3.0	3.0	3.0
	D	6.0	5.0	5.0	4.0

Departure-Departure Separations (seconds) - Peculiar to this Experiment and Location

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	60	60	90	94
	B	60	60	60	64
	C	60	60	60	64
	D	120	120	120	90

Departure-Arrival Separation (n.m.): 2.4 - 2.8 miles, larger values behind smalls

Arrival-Departure Separation (seconds): 47 seconds except 51 seconds behind smalls

19. Route Data: See Figure 2.

20. Two-Way Path Data: To be based on detailed network coding.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	6.0
B	6.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 12 minutes.

23. Departure Runway Queue Control: Not applicable.

24. Gate Hold Control: Not applicable.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 30 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (percent)			
	Class	F	Q	RR	R
Runway 4	A	100	0	0	0
	B	57	0	43	0
	C	0	6	58	36
	D	0	0	28	72

29. Arrival Runway Occupancy Times:

	Class	Runway Occupany Times (seconds) F	Q	RR	R
Runway 4	A	40	-	-	-
	B	42	-	48	-
	C	-	41	44	52
	D	-	-	47	58

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	120	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data and calibrated model.

36. Runway Crossing Times: 20 seconds or more if different in IFR2.

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.

Figure 2

(Under Development)

LGA STAGE - 1 EXPERIMENTS

Experiment No. 5

Objective:

To obtain baseline delay estimates, in VFR1 conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
4	13

Related Comparison Experiments:

None directly in Stage-1; possible in Stage-2.

(See attached input summary).

LGA INPUT DATA - EXPERIMENT NO. 5

A. LOGISTICS

1. Title: LaGuardia Airport Airfield Simulation Model Stage-1 Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times:

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
National	NA
North Central	NC
Northwest	NW
Ozark	OZ
Piedmont	PI
Southern	SO
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2

11. Runway Identification: 4, 13.

12. Departure Runway End Links: 114.

13. Runway Crossing Links: 82, 83, 85, 86.

14. Exit Taxiway Location: 50, 83, 84, 87

15. Holding Areas: 44, 45, 46, 49

16. Airline Gates: Using Gate Areas.

17. General Aviation Basing Areas: West of terminal area, 48.

C. ATC PROCEDURES

18. Aircraft Separations: These values are based on Report No. FAA-EM-78-8A.

Arrival-Arrival Separation (n.m.) - VFR

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.9	1.9	1.9	1.9
	B	2.7	1.9	1.9	1.9
	C	2.7	1.9	1.9	1.9
	D	4.5	3.6	3.6	2.7

Departure-Departure Separations (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	35	45	45	50
	B	50	60	60	60
	C	50	60	60	60
	D	120	120	120	90

Departure-Arrival Separation (n.m.): 0.25 miles

Arrival-Departure Separation (seconds): 10 seconds behind small, 22 seconds behind large, and 47 seconds behind heavies.

19. Route Data: See Figure 2.

20. Two-Way Path Data: To be based on detailed network coding.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 12 minutes.

23. Departure Runway Queue Control: Not applicable.

24. Gate Hold Control: Not applicable.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 30 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (percent)			
	Class	F	Q	RR	R
Runway 4	A	100	0	0	0
	B	57	0	43	0
	C	0	6	58	36
	D	0	0	28	72

29. Arrival Runway Occupancy Times:

	Class	Runway Occupany Times (seconds) F	Q	RR	R
Runway 4	A	40	-	-	-
	B	42	-	48	-
	C	-	41	44	52
	D	-	-	47	58

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	110	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.

Figure 2

(Under Development)

LGA STAGE - 1 EXPERIMENTS

Experiment No. 6

Objective:

To obtain baseline delay estimates, in VFR1 conditions, for the following runway-use configurations:

Arrival Runways	Departure Runways
13	13

Related Comparison Experiments:

Experiments 7, 10, and 10A have same runway-use, but they different weather, namely IFR1 and improvements. Is the glide-slope, critical-zone impact reflected in this experiment (?) or just in IFR?

(See attached input summary).

LGA INPUT DATA - EXPERIMENT NO. 6

A. LOGISTICS

1. Title: LaGuardia Airport Airfield Simulation Model Stage-1 Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
National	NA
North Central	NC
Northwest	NW
Ozark	OZ
Piedmont	PI
Southern	SO
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 1

11. Runway Identification: 13

12. Departure Runway End Links: 114

13. Runway Crossing Links: 82, 83, 85, 86

14. Exit Taxiway Location: 88, 118, 119

15. Holding Areas: 44, 45, 46, 49

16. Airline Gates: Using Gate Areas

17. General Aviation Basing Areas: West of terminal area, 48.

C. ATC PROCEDURES

18. Aircraft Separations: These values are based on Report No. FAA-EM-78-8A.

Arrival-Arrival Separation (n.m.)-VFR

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.9	1.9	1.9	1.9
	B	2.7	1.9	1.9	1.9
	C	2.7	1.9	1.9	1.9
	D	4.5	3.6	3.6	2.7

Departure-Departure Separations (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	35	45	45	50
	B	50	60	60	60
	C	50	60	60	60
	D	120	120	120	90

Departure-Arrival Separation (n.m.): 0.4 miles (Runway Clearance Times)

To release a departure there must be an 8-mile interval between arrivals to protect the glide-slope critical area.

Arrival-Departure Separation (seconds): (Runway Occupancy Times)

19. Route Data: See Figure 2.

20. Two-Way Path Data: To be based on detailed network

AD-A099 865 PEAT MARWICK MITCHELL AND CO SAN FRANCISCO CALIF F/G 1/2
NEW YORK AIRPORTS DATA PACKAGE NUMBER 2, JOHN F. KENNEDY INTERN--ETC(U)
AUG 78 DOT-FA77WA-3961

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21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	2.0
B	3.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 12 minutes.

23. Departure Runway Queue Control: Not applicable.

24. Gate Hold Control: Not applicable.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 30 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (percent)		
	Class	L	N	M
Runway 13	A	100	0	0
	B	57	0	43
	C	0	42	58
	D	0	91	9

29. Arrival Runway Occupancy Times:

	Class	Runway Occupany Times (seconds) L	N	M
Runway 9	A	40	-	-
	B	42	-	48
	C	-	41	44
	D	-	-	47

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	110	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: Not applicable.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: 20 seconds

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.

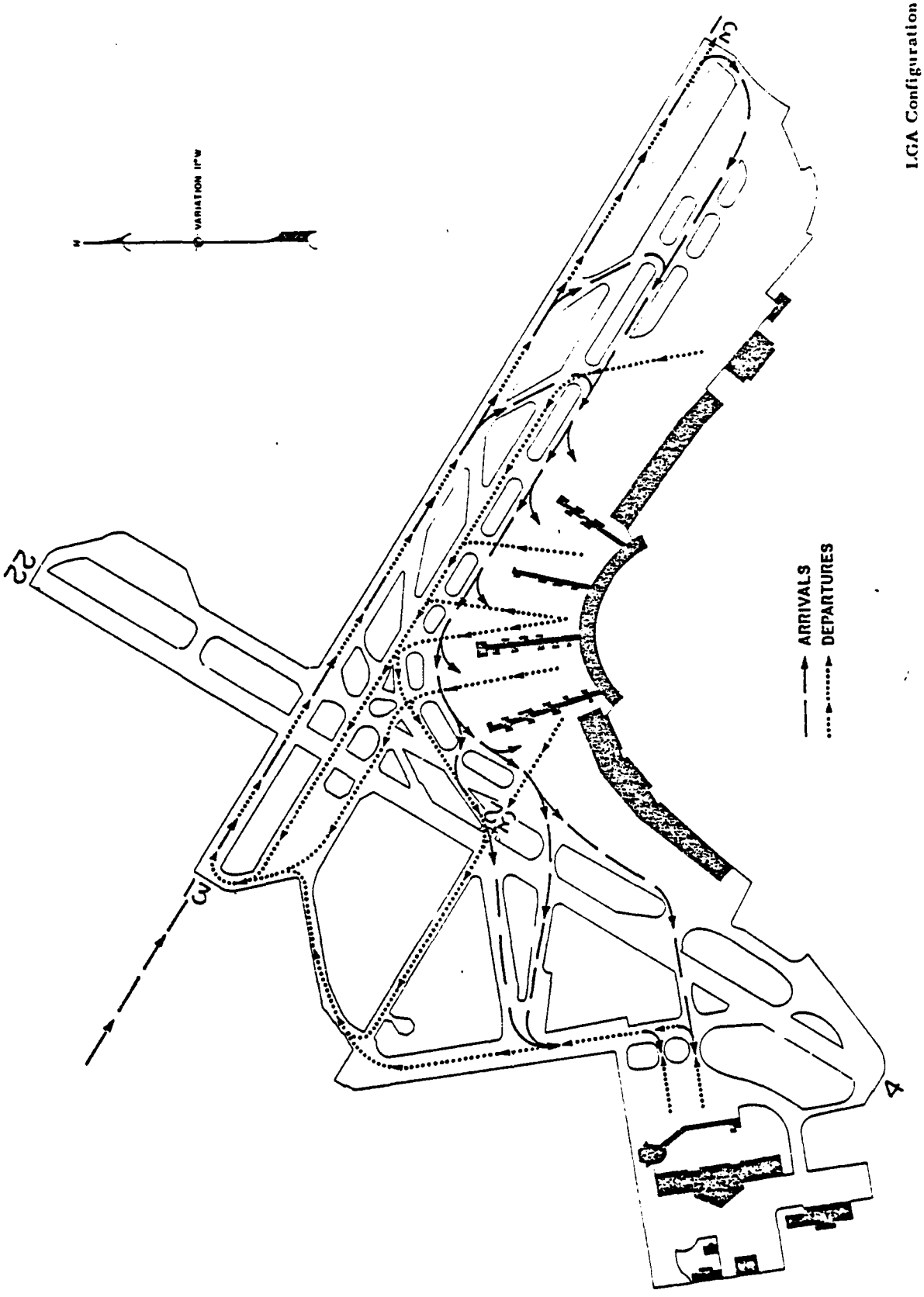

LGA Configuration 6
VARIATION 14°W
ARRIVALS
DEPARTURES
22
3
4
13
31

Figure 2

LGA - STAGE 1

Experiment No. 7

Objective:

To obtain baseline delay estimates in IFR1 conditions for the following runway-use configuration:

Arrivals	Departures
13	13

Related Comparison Experiments:

Experiments 10 and 10A have same runway use and weather, but they involve improvements.

(See attached change sheet)

Experiment Number: 7 (Input changes from experiment number 6)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Locations	
1 Cells	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
15 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values and critical zone impact
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 (if different)
38 Demand	

LGA - STAGE 1

Experiment No. 10

Objective:

To evaluate impact of relocating R13 glide slope antenna to reduce critical zone impact when there are mixed operations on R13. This experiment assumes that the impact is reduced and a departure can be released when there is a _____ mile interval between arrivals.

Related Comparison Experiments

Experiment No. 7 serves as the comparison case for this experiment.

(See attached change sheet)

Experiment Number: 10 (Input changes from experiment number 6)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Initiation	
1 Goals	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values and new critical zone impact
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 (if different)
38 Demand	

LGA - STAGE 1

Experiment No. 10A

Objective:

To evaluate the impact of LGA-TEB interaction on delays experienced by mixed operations on R13 in IFR1 weather conditions.

Related Comparison Experiments:

Experiment No. 7 serves as the "No-other-improvement" comparison case for this experiment. Experiment No. 10 is the comparison case if one wants to examine the limits imposed on the delay reductions of Experiment 10 by the LGA-TEB interaction.

(See attached change sheet)

Experiment Number: 10A (Input changes from experiment number 6)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Locations	
1 Title	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Connection limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	IFR1 Values and LGA-TEB effects
19 Route data	
20 Two-way path data	
21 Common approach paths	IFR1 Values
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	
29 Arrival runway occupancy times	IFR1 Values
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	IFR1 Values
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	IFR1 (if different)
38 Demand	

LGA - STAGE 1

Experiment No. 8

Objective:

To obtain baseline delay estimates, in IFR1 conditions, for the following runway use configuration:

Arrivals	Departures
R4	R4

Related Comparison Experiments:

Experiment No. 13 has same runway use and weather conditions as No. 8 but with an improved taxiway network for departures west of R4/22.

(See attached data input summary)

LGA INPUT DATA - EXPERIMENT NO. 8

A. LOGISTICS

1. Title: LaGuardia Airport Airfield Simulation Model Stage 1 Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
National	NA
North Central	NC
Northwest	NW
Ozark	OZ
Piedmont	PI
Southern	SO
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 1

11. Runway Identification: 4

12. Departure Runway End Links: 77, 190

13. Runway Crossing Links: 191

14. Exit Taxiway Location: 50, 84, 86, 87

15. Holding Areas: 44, 45, 46, 49

16. Airline Gates: See Figure 1.

17. General Aviation Basing Areas: West of terminal area, 48.

C. ATC PROCEDURES

18. Aircraft Separations: These values are based on Report No. FAA-EM-78-8A.

Arrival-Arrival Separation (n.m.) - IFR - Without Buffer

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	3.0	3.0	3.0	3.0
	B	4.0	3.0	3.0	3.0
	C	4.0	3.0	3.0	3.0
	D	6.0	5.0	5.0	4.0

Departure-Departure Separations (seconds) - IFR - Case 26 Specific

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	60	60	82	84
	B	60	60	60	62
	C	60	60	60	62
	D	120	120	120	90

Departure-Arrival Separation (n.m.): 0.4 miles

Arrival-Departure Separation (seconds): 10 seconds

19. Route Data: See Figure 2.

20. Two-Way Path Data: To be based on detailed network coding.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	6.0
B	6.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 12 minutes.

23. Departure Runway Queue Control: Not applicable.

24. Gate Hold Control: Not applicable.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 30 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

		Exit Utilization (percent)				
	Class	F	Q	P	RR	R
Runway 4	A	100	0	0	0	0
	B	0	57	43	0	0
	C	0	6	58	36	0
	D	0	0	9	72	19

29. Arrival Runway Occupancy Times:

	Class	Runway Occupany Times (seconds) F	Q	P	RR	R
Runway 4	A	40	-	-	-	-
	B	42	-	48	-	-
	C	-	41	44	52	-
	D	-	-	47	58	64

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	120	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: Not applicable. Gate area used.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.

Figure 2

(Under Development)

LGA - STAGE 1

Experiment No. 13

Objective:

To evaluate the impact of an improved taxiway network west of R4/22 on IFR1, mixed operations on R4.

Related Comparison Experiments:

Experiment No. 8 serves as the comparison case for this experiment. Model has one, and only one, route from gate to roll, but application is still possible by varying schedule inputs.

(See attached change sheet)

Experiment Number: 13 (Input changes from experiment number 8)

SIMULATION MODEL INPUT	DESCRIPTION OF INPUT CHANGE
a. Logistics	
1 Goals	
2 Random number seeds	
3 Start and finish times	
4 Print options	
5 Airline names	
6 Processing options	
7 Termination limits	
8 Time switch	
b. Airfield Physical Characteristics	
9 Airfield network	New taxiway links west of R4/22
10 Number of runways	
11 Runway identification	
12 Departure runway end links	
13 Runway crossing links	Possible new departure crossings
14 Exit taxiway location	
15 Holding areas	
16 Airline gates	
17 General aviation basing areas	
c. ATC Procedures	
18 Aircraft separations	
19 Route data	New departure routes
20 Two-way path data	Possible new ones
21 Common approach paths	
22 Vectoring delays	
23 Departure runway queue control	
24 Gate hold control	Possible change due to new departure scheme
25 Departure airspace constraints	
26 Departure queue	
27 Runway crossing delay control	
d. Aircraft Operational Characteristics	
28 Exit taxiway utilization	Possible change
29 Arrival runway occupancy times	Possible change
30 Touch-and-go runway occupancy times	
31 Departure runway occupancy times	
32 Taxi speeds	
33 Approach speeds	
34 Gate service times	
35 Airspace travel times	
36 Runway crossing times	
37 Lateness distribution	Possible change for departures
38 Demand	Need to circumvent problem of one route from gate to roll

LGA - STAGE 1

Experiment No. 9

Objective:

To evaluate the potential delay savings of improving airspace procedures so that the flow of arrivals to R13, in IFR1 weather conditions, is independent of the flow of departures on R4.

Related Comparison Experiments:

The potential benefits of these improved airspace procedures are obtained by comparison with Experiment No. 7, arrivals and departures on R13.

Remaining Data Items:

- Achievable separations from improvements, e.g., as compared to Study Case 19 in VFR1.

(See attached data input summary)

LGA INPUT DATA - EXPERIMENT NO. 9

A. LOGISTICS

1. Title: LaGuardia Airport Airfield Simulation Model Stage 1 Run

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985.

3. Start and Finish Times: To be determined by Task Force.

4. Print Options: Detailed run for one random number seed. Summary run for ten random number seeds.

5. Airline Names:

Name	Code
Air Taxi	AT
Allegheny	AL
American	AA
Braniff	BN
Delta	DL
Eastern	EA
National	NA
North Central	NC
Northwest	NW
Ozark	OZ
Piedmont	PI
Southern	SO
Trans World	TW
United	UA

6. Processing Options: First run to check model input. Other runs in COMPUTE mode.

7. Truncation Limits: $\pm$ 3 standard deviations.

8. Time Switch: Not applicable.

B. AIRFIELD PHYSICAL CHARACTERISTICS

9. Airfield Network: See Figure 1.

10. Number of Runways: 2

11. Runway Identification: 4, 13

12. Departure Runway End Links: 77, 190

13. Runway Crossing Links: 81, 82, 85, 86, 191

14. Exit Taxiway Location: 88, 118, 119

15. Holding Areas: 44, 45, 46, 49

16. Airline Gates: See Figure 1.

17. General Aviation Basing Areas: West of terminal area, 48.

C. ATC PROCEDURES

18. Aircraft Separations: These values are based on Report No. FAA-EM-78-8AA.

Arrival-Arrival Separation (n.m.) IFR Without Buffer if achievable

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	3.0	3.0	3.0	3.0
	B	4.0	3.0	3.0	3.0
	C	4.0	3.0	3.0	3.0
	D	6.0	5.0	5.0	4.0

Departure-Departure Separations (seconds) - IFR - if achievable

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	60	60	60	60
	B	60	60	60	60
	C	60	60	60	60
	D	120	120	120	90

Departure-Arrival Separation (n.m.): 0.4 miles

Arrival-Departure Separation (seconds): 10 seconds

19. Route Data: See Figure 2.

20. Two-Way Path Data: To be based on detailed network coding.

21. Common Approach Paths:

Aircraft Class	Length of Common Approach Path
A	6.0
B	6.0
C	6.0
D	6.0

22. Vectoring Delays:

This input allocates delays among vectoring and holding. Model input values will be used that hold arrival aircraft if delays to arrival aircraft exceed 12 minutes.

23. Departure Runway Queue Control: Not applicable.

24. Gate Hold Control: Not applicable.

25. Departure Airspace Constraints:

Aircraft are not held at gates due to departure airspace constraints.

26. Inter-Arrival Gap:

With this runway use, arrival aircraft are delayed in the arrival airspace when departure delays exceed 20 minutes.

27. Runway Crossing Delay Control:

Arrival and departure runway operations are only interrupted for a taxiing aircraft to cross an active runway when the taxiing aircraft is delayed by 30 minutes or more.

D. AIRCRAFT OPERATIONAL CHARACTERISTICS

28. Exit Taxiway Utilization:

	Class	Exit Utilization (percent) L	N	M
Runway 13	A	100	0	0
	B	57	43	0
	C	6	58	36
	D	0	28	72

29. Arrival Runway Occupancy Times:

	Class	Runway Occupany Times (seconds) L	N	M
Runway 22	A	40	-	-
	B	42	48	-
	C	41	44	52
	D	-	47	58

30. Touch & Go Occupancy Times: Not applicable.

31. Departure Runway Occupancy Times:

Aircraft Class	Runway Occupancy Time (seconds) Mean	Standard Deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds: To be based on reduced field data.

33. Approach Speeds:

Aircraft Class	Approach Speed (knots) Mean	Standard Deviation
A	110	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: Not applicable. Gate area used.

35. Airspace Travel Times: To be based on reduced field data.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be determined by Task Force.

38. Demand: To be determined by Task Force.

LGA Configuration 1

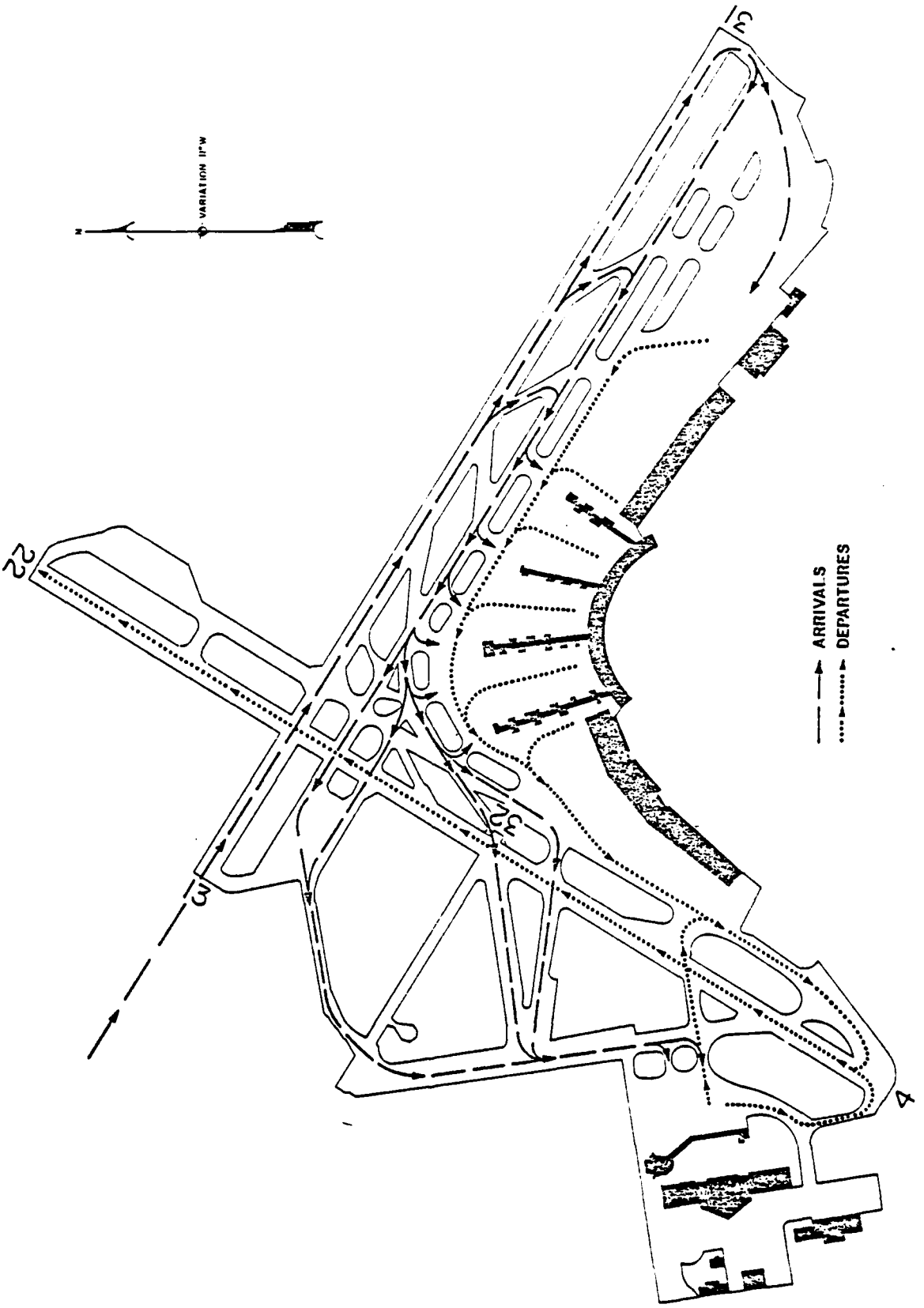
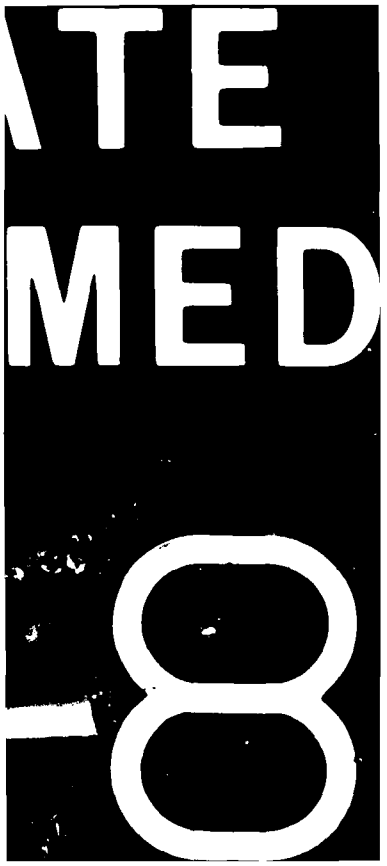


Figure 2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